

Claims

1. A method of determining a condition of a test specimen, said method comprising,
 - identifying a plurality of first test specimens having a first known condition and observing from each of said first test specimens a first fluorescence spectrum characteristic of said first known condition,
 - obtaining an average reflectance spectrum from said plurality of first test specimens,
 - obtaining a reflectance spectrum from a second test specimen that is observed to produce a second fluorescence spectrum that is not characteristic of said first known condition,
 - obtaining a reflectance spectrum residual by subtracting said average reflectance spectrum from said reflectance spectrum obtained from said second test specimen, and
 - determining said condition of said second test specimen based at least in part on an amplitude of one or more features of said reflectance spectrum residual.
2. The method of claim 1, wherein said plurality of first test specimens comprise a plurality of first tissue specimens and said second test specimen comprises a second tissue specimen.
3. The method of claim 2, wherein said plurality of first tissue specimens and said second tissue specimen comprise human cervical tissue, said first known condition is a known state of health, and said condition of said second test specimen is a state of health to be determined.
4. The method of claim 2, wherein said known state of health comprises one of the conditions of normal squamous tissue, metaplasia, CIN I, and CIN II/III.
5. The method of claim 1, further comprising,
 - obtaining additional optical information from said second test specimen, and
 - evaluating said additional optical information with said fluorescence spectrum and said reflectance spectrum from said second test specimen to determine said condition of said second test specimen.

1 6. The method of claim 5, wherein said additional optical information comprises video
2 information.

1 7. The method of claim 5, wherein said additional optical information comprises an optical
2 image.

1 8. The method of claim 5, wherein said plurality of first test specimens comprise a plurality of
2 first tissue specimens and said second test specimen comprises a second tissue specimen.

1 9. The method of claim 8, wherein said plurality of first tissue specimens and said second tissue
2 specimen comprise human cervical tissue, said first known condition is a known state of
3 health, and said condition of said second test specimen is a state of health to be determined.

1 10. The method of claim 8, wherein said known state of health comprises one of the conditions
2 of normal squamous tissue, metaplasia, CIN I, and CIN II/III.

1 11. A spectroscopic system for determining a condition of a test specimen, comprising,
2 a data collection module that observes a first fluorescence spectrum characteristic of a first
3 known condition from each of a plurality of first test specimens having said first known
4 condition, that observes a first reflectance spectrum from each of said plurality of first test
5 specimens, and that observes a reflectance spectrum from a second test specimen that is
6 observed to produce a second fluorescence spectrum that is not characteristic of said first
7 known condition,
8 a computation module that compute an average reflectance spectrum from said first
9 reflectance spectrum from each of said plurality of first test specimens, and that computes
10 a reflectance spectrum residual by subtracting said average reflectance spectrum from
11 said reflectance spectrum obtained from said plurality of second test specimens, and
12 an analysis module that determines a condition of said second test specimen based at least
13 in part on an amplitude of one or more features of said reflectance spectrum residual.

1 12. The system of claim 11, wherein said plurality of first test specimens comprise a plurality of
2 first tissue specimens and said second test specimen comprises a second tissue specimen.

1 13. The system of claim 12, wherein said plurality of first tissue specimens and said second
2 tissue specimen comprise human cervical tissue, said first known condition is a known state
3 of health, and said condition of said second test specimen is a state of health to be
4 determined.

1 14. The system of claim 12, wherein said known state of health comprises one of the conditions
2 of normal squamous tissue, metaplasia, CIN I, and CIN II/III.

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1 15. The system of claim 11, wherein said data collection module obtains additional optical
2 information from said second test specimen, and
3 said analysis module evaluates said additional optical information with said fluorescence
4 spectrum and said reflectance spectrum from said second test specimen to determine said
5 condition of said second test specimen.

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1 16. The system of claim 15, wherein said additional optical information comprises video
2 information.

1 17. The system of claim 15, wherein said additional optical information comprises an optical
2 image.

1 18. The system of claim 15, wherein said plurality of first test specimens comprise a plurality of
2 first tissue specimens and said second test specimen comprises a second tissue specimen.

1 19. The system of claim 18, wherein said plurality of first tissue specimens and said second
2 tissue specimen comprise human cervical tissue, said first known condition is a known state

3 of health, and said condition of said second test specimen is a state of health to be
4 determined.

1 20. The system of claim 18, wherein said known state of health comprises one of the conditions
2 of normal squamous tissue, metaplasia, CIN I, and CIN II/III.

1 21. A method of determining a disease state in a specimen, the method comprising the steps of:
2 obtaining a reflectance spectrum from a test specimen having a fluorescence spectrum that
3 is not characteristic of a healthy tissue;
4 subtracting an average reflectance spectrum obtained from a plurality of specimens from
5 said reflectance spectrum to produce a reflectance spectrum residual, each producing a
6 fluorescence spectrum characteristic of healthy tissue; and
7 determining disease state in said test specimen based upon one or more characteristics of
8 said reflectance spectrum residual.

1 22. The method of claim 21, wherein said test specimen is selected from the group consisting of
2 cervical tissue, intestinal tissue, esophageal tissue, and skin tissue.

1 23. The method of claim 21, wherein said disease state is selected from the group consisting of
2 normal squamous tissue, metaplasia, CIN I, and CIN II/III.

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